Assessing bias correction of CFSv2 hindcasts conditional on climate regimes.

Dan C. Collins, Emily E. Riddle, Michelle L. L'Heureux, Nathaniel C. Johnson, Steven B. Feldstein, and Marshall B. Stoner

Climate regimes such as Madden-Julian Oscillation (MJO) and El Niño-Southern Oscillation (ENSO) are known to influence circulation patterns over the North American region on intraseasonal to interannual timescales. An objective forecast system is needed to combine the statistics of extratropical impacts of tropical forcing with the skill of dynamical models in reproducing these impacts, such as forecasts from the Climate Forecast System version 2 (CFSv2). Using cluster analysis to approximate the distribution of 500 hPa geopotential height patterns over the North American region, the influence of MJO and ENSO are analyzed as shifts in the pattern frequency distribution for lags of one to four weeks. Statistically significant predictability is demonstrated out to four weeks. While the observed relationships are relatively well reproduced in the 11-year daily CFSv2 reforecast dataset, anomalies in frequency are slightly weaker and persist for slightly longer in the model. In addition to analysis of bias in the distribution of circulation patterns, correction of bias in precipitation has been analyzed. Using adaptive regression, which updates prior bias estimates with additional information similar to a Bayesian statistical model, probability distributions derived from the CFSv2 reforecast data are calibrated against observations, and the skill of corrected forecasts is assessed. Future work will develop a Bayesian statistical model to correct CFSv2 forecasts conditional on climate regimes such as MJO and ENSO.